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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|-----------------------------|------------------------------|------------------------|
| 10/542,834 | 07/20/2005 | Hendrik Klaas Jan Ten Dolle | NL030008 | 9032 |
| 65913 7590 05/30/2007 NXP, B.V. NXP INTELLECTUAL PROPERTY DEPARTMENT M/S41-SJ 1109 MCKAY DRIVE SAN JOSE, CA 95131 | | | EXAMINER SUMMONS, BARBARA | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|-----------------|------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/542,834 | TEN DOLLE ET AL. | |
| | Examiner | Art Unit | |
| | Barbara Summons | 2817 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 July 2005 (pre-amendment).
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 4-12 is/are rejected.
- 7) ☒ Claim(s) 2 and 3 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 July 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. Figure 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated (see page 3, lines 26-32 and page 8, lines 18-20). See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

On page 1, on lines 1-2, the specification should not refer to the claims and the reference to the language of "the preamble of claim 1" should be deleted, especially since claims can be added or deleted during prosecution and renumbered at issuance.

Appropriate correction is required.

3. Whereas Applicants' arrangement of the specification follows the guidelines below, the section headings have not been included, and it is suggested that the appropriate section headings outlined below be inserted at the corresponding appropriate locations in the specification. For example, "BACKGROUND OF THE

INVENTION" should be inserted on page 1, before the first paragraph; "BRIEF SUMMARY OF HTE INVENTION" should be inserted on page 4, after line 27; and insert on page 8 headings (h) and (i), etc.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Claim Objections

4. Claims 7 and 8 are objected to because of the following informalities:

In claim 7, on line 3, note that "substantial" should be - - substantially - -.

In claim 8, on line 7, "an fraction" should be -- a fraction --.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 7, 8 and 10 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 7, lines 2-3 recite "a total capacitance of all branches of said lattice type filter second is substantial(ly) equal", which appears to be referring to a sum total of the capacitances of all four branches of the lattice filter and which begs the question: "a total capacitance... is substantial(ly) equal" to what?

For any art rejections that may follow the Examiner assumes the meaning of claim 7, lines 2-4 to be: -- wherein each of the branches of said lattice type filter section have a substantially equal total capacitance at least outside said passband --.

In Claim 8, the recited feature "said parallel capacitances C" (see line 2), lacks antecedent basis in the claim. Should the dependency of this claim, or claim 7 from which it depends, be changed to claim 2? See claim 2, line 3, where antecedent basis for "parallel capacitances" can be found.

In Claim 10, the recited feature "said means for impedance matching" (see line 2) lacks antecedent basis in the claim. Should claim 10, correctly depend from claim 9?

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 4 and 9-11 are rejected under 35 U.S.C. § 102(e) as being anticipated by Ohara et al. U.S. 6,870,446.

Fig. 10 of Ohara et al. discloses a resonator filter structure formed of thin film bulk acoustic wave resonators (see Figs. 1-3) arranged on a substrate 5 for providing a passband (see e.g. Fig. 30c) which inherently can be defined by a center frequency and upper and lower cutoff frequencies, comprising: an input port IN1 and IN2; an output port OUT1 and OUT2; at least a lattice type filter section having two lattice branch types being a lattice branch with resonators 201 and a series branch with resonators 200; and wherein each of the resonators inherently have a resonance frequency and an anti resonance frequency. Ohara further discloses that this filter as well as the filters shown in Figs. 6 and 9 (see col. 11, lines 14-19) are considered “switching filters” because they function as either a bandpass filter or an all block-filter (see e.g. col. 10, lines 40-52 and Figs. 30a-30d) depending on whether a DC bias voltage (i.e. from source 302 in Fig. 10) is applied to at least one branch of the resonators (i.e. the series branch in Fig. 10). An example is discussed regarding the ladder filter of Fig. 6 at col. 10, lines 8-34, wherein

the resonators begin with the prior art arrangement of the resonance frequency of the series arm resonators equal to the antiresonance frequency of the lattice/parallel arm resonators and the impressed voltage to resonators 200 then makes the resonance frequencies of all of the resonators equal and the antiresonance frequencies of all of the resonators also equal (col. 10, lines 23-34). Additionally, Ohara specifically discloses that the reverse process (see "vice versa" col. 10, line 52) may alternatively be used, such that the resonators begin in a state of having all of their resonance frequencies equal and all of their antiresonance frequencies equal (see col. 10, lines 53-59 and Figs. 30b,d) with the voltage impressed by source 300 (302 in Fig. 10) then being a means for moving at least one of the antiresonance frequencies or the resonance frequencies of either of the series or lattice/parallel arms or both (see also col. 10, lines 60-65) relative to the other to provide the bandpass response (Figs. 30a,c).

Regarding claims 9 and 10, see e.g. Fig. 13 with means for impedance matching being the LC circuits at the input and output ports (see also col. 14, lines 15-17).

Regarding claim 11, lattice filters are balanced filters (see col. 6, lines 4-6).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 5 and 6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohara et al. U.S. 6,870,446 taken alone.

Ohara et al. discloses the invention as discussed above, and Ohara et al. also discloses that the piezoelectric layer of the thin film bulk acoustic wave resonators comprises AlN or ZnO (see e.g. col. 17, lines 21-23). Further regarding claim 6, since the silicon oxide layer is "optional", it need not be present.

However, Ohara et al. does not explicitly disclose that the thin film bulk acoustic wave resonators that all have the same resonance frequency also all have an equal thickness of their piezoelectric layers.

Ohara et al. does disclose that one way to make the resonance frequency of such resonators different would be to change the thickness of the piezoelectric layer (see col. 10, lines 11-14). Such a teaching implicitly suggests, and further the Examiner takes Official Notice that it would have been extremely well known, to form thin film bulk acoustic wave resonators of the same resonance frequency each with a piezoelectric layer of the same thickness.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the resonator filter of Ohara (Fig. 10), if even necessary, by having provided each of the resonators 200,201 that all have the same resonance frequency with a piezoelectric layer of the same thickness because it is the thickness of such a resonator that inherently determines the resonance frequency thereof, as would have been known by one of ordinary skill in the art, such that having different thicknesses of the piezoelectric layers would have been a known way to deviate the resonance frequencies thereof, as explicitly suggested by Ohara (col. 10, lines 11-14), which implicitly suggests to one of ordinary skill that conversely the same thicknesses of the layers of the resonators including the piezoelectric layer would have provided resonators with the same resonance frequencies.

Furthermore, although the silicon oxide layer is "optional", providing one as any of a passivation layer over the resonators or a low acoustic impedance layer of an acoustic mirror 6 (see Fig. 3) of the resonators or as a membrane/etch stop layer 4 (see Fig. 1) of the resonators would have each been extremely well known by one of ordinary skill in the art at the time the invention was made.

11. Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohara et al. U.S. 6,870,446 in view of Taniguchi U.S. 2001/0012237 (also cited on the Search Report of the corresponding PCT application).

Ohara discloses the invention as discussed above, except for explicitly disclosing that each of the branches of the ladder filter has a total capacitance that is substantially

equal to that of all of the other branches, at least outside of the passband of the filter (i.e. away from the center frequency).

Taniguchi explicitly discloses that it is known in a lattice filter using acoustic resonators to provide the total electrode capacitances of the series branch/arm resonators to be substantially equal to the total electrode capacitances of the lattice branch/arm resonators in the region spaced away from the resonant frequency (i.e. outside of the passband) in order to provide the benefit of increased attenuation in stop band being the region away from the passband of the filter (see section [0091]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the resonator filter of Ohara (Fig. 10), if even necessary, by having provided that the resonators in each branch of the lattice filter each have substantially the same total capacitance, because Ohara is silent as to the capacitances of the resonators in the lattice filter branches such that they may already be equal, but if not, such an obvious modification as making the capacitances in each of the branches the same at least outside of the passband, would have provided the advantageous benefit of increased attenuation in the stop band/region away from the passband of the filter, as explicitly suggested by Taniguchi (section [0091]) and as would have been known by one of ordinary skill in the acoustic wave resonator lattice filter art.

12. Claim 12 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohara et al. U.S. 6,870,446 in view of Frank et al. U.S. 6,542,055.

Ohara discloses the invention as discussed above, except that both the input and output ports of the filter are balanced, rather than showing one of the ports being unbalanced.

Frank et al. discloses that it is known that one of the ports of a lattice filter may be provided as an unbalanced port by simply grounding one of the terminals (see the abstract lines 2-4 and col. 3, lines 17-25), and that this is a design choice based on the peripheral circuitry and the overall design of the entire device (col. 3, lines 22-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the resonator filter of Ohara (Fig. 10) by having provided that one of the ports be an unbalanced port by grounding one of the terminals thereof, because such an obvious modification would have been a well known design choice based on the need for balanced unbalanced conversion between peripheral circuitry and the location of the filter in the entire device, as explicitly suggested by Frank (see col. 3, lines 17-25).

Allowable Subject Matter

13. Claims 2 and 3 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

14. Claim 8 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

15. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not disclose or fairly suggest a resonator filter in a lattice arrangement with the resonators each having substantially equal resonance frequencies and antiresonance frequencies and moving at least one of these frequencies via a parallel capacitance provided to the resonators in one of the series or lattice arms, or wherein such a parallel capacitance is as defined by the claim 8 equation.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Aigner et al. U.S. 2003/0179053 is a Patent family member of a document cited on the Search Report of the corresponding PCT application and discloses an acoustic resonator lattice filter that provides unbalanced to balanced conversion.

Ella U.S. 6,388,544 is also a Patent family member of a document cited on the Search Report of the corresponding PCT application.

Onishi et al. U.S. 5,892,418 shows that a lattice filter is typically balanced at both ports.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara Summons whose telephone number is (571) 272-1771. The examiner can normally be reached on M-Th, M-Fr.

Art Unit: 2817

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

bs
May 25, 2007

A handwritten signature in cursive script that reads "Barbara Summons". The signature is written in black ink and is positioned above the printed name and title.

**BARBARA SUMMONS
PRIMARY EXAMINER**